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A Strain of Papaya Mosaic Potexvirus in *Scutellaria*[1]

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INTRODUCTION: Skullcap, *Scutellaria spp.* L. is a member of the mint family, *Labiatae*. It is represented by more than 300 species of perennial herbs distributed worldwide (Bailey and Bailey 1978). Skullcap grows wild or is naturalized as ornamentals and medicinal herbs. Fuschia skullcap is a Costa rican variety with long, trailing stems, glossy foliage and clusters of fuschia-colored flowers.

SYMPTOMS: Vegetative propagations of fuschia skullcap grown in a Central Florida nursery located in Manatee County showed symptoms of viral infection in the fall of 1998, including foliar mottle and chlorotic to necrotic ring-spots and wavy-line patterns (Fig. 1).

SURVEY AND DETECTION: Symptomatic leaves were collected and examined by electron microscopy. Flexuous virus-like particles, approximately 500 nm long, like those associated with potexvirus infections, were observed. Subsequent enzyme-linked immunosorbent assay (ELISA) for a potexvirus known to occur in Florida, resulted in confirmation of infection by papaya mosaic virus (PapMV).

Increasing numbers of naturally occurring PapMV hosts are being identified. Detection by ELISA has been helpful in recognizing these new hosts. However, current ELISA tests lack the sensitivity to distinguish between specific strains of PapMV, of which only one is known to actually infect the economically important papaya. [Papaya is grown for its edible fruit and protein-digesting enzyme, papain (Bailey and Bailey 1978).] Predicting susceptibility of papaya to serologically positive PapMV isolates still must be determined by inoculations. The skullcap isolate does not infect papaya.

VIRUS DISTRIBUTION: Several naturally occurring infections by various strains of PapMV have been reported: The type strain occurring on papaya [*Carica papaya* L. (*Caricaceae*) (de Bokx 1965)]; Plantago severe mottle strain on broad-leaved plantain [*Plantago*

Fig.1. Fuschia skullcap (*Scutellaria sp.*) infected with papaya mosaic virus. Symptoms include foliar mottle and chlorotic to necrotic ring-spots and wavy-line patterns.

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major L. (*Plantaginaceae*) (Rowhani and Peterson 1980)]; Argentine plantago strain on broad-leaved plantain, common dandelion [*Taraxacum officinale* Weber (Compositae)] and china aster [*Callistephus chinensis* (L.) Nees (*Compositae*) (Gracia *et al.* 1983)]; Boussingaultia mosaic strain on madeira vine [*Boussingaultia cordifolia* Ten. = *Anredera cordifolia* (Ten.) Steenis (*Basellaceae*) (Phillips *et al.* 1985)]; Ullucus strain on ullucu [*Ullucus tuberosus* Loz. (*Basellaceae*) (Brunt *et al.* 1982)]; an Australian strain on khaki weed [*Alternanthera pungens* Kunth. (*Amaranthaceae*) (Geering and Thomas 1999)]; and two Florida strains, one on the pointed gourd [*Trichosanthes dioica* Roxb. (*Cucurbitacae*) (Purcifull *et al.* 1999)] and an uncharacterized isolate found in moss rose [*Portulaca grandiflora* Hook. (*Portulacaceae*)].

TRANSMISSION: PapMV is a member of the potexvirus group. Infective virions occur in leaf sap in high concentrations, are slightly flexuous, rod-shaped and measure about 530 nm. They are efficiently spread by pruning, cultivation, leaf to leaf contact, propagation of infected cuttings and probably by insect activities (Murant *et al.* 1988). Risk of infection increases for perennially grown plants established for long-term cultivation, vegetatively propagated plants that may have originated from infected cuttings, and frequently trimmed plants subjected to virus-infested tools or hands. Seed transmission has not been reported.

CONTROL: Infection by PapMV can be avoided by (1) starting plants from seed, (2) propagating cuttings from healthy plants, (3) sterilizing cutting tools and pots by heating in a dry oven for one hour at 155°C (300°F) or inactivating the virus by disinfecting tools and pots and soaking them in freshly prepared 10% (1 part + 9 parts water) household bleach solution, (4) spacing plantings, and (5) controlling activities of insects and free-roving animals. If PapMV is suspected, verify with serological testing. Rogue infected plants. The virus is persistent, remaining infective in papaya sap up to six months at room temperature (25°C = 77°F). Heating infected plant material to 76°C (169°F) for ten minutes will inactivate PapMV and minimizes the risk of spread and contamination.

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